Industry-specific impact assessment program: avocado

Impact assessment report for project *Data collection to facilitate supply chain transparency* (AV12007)

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Executive Summary

What the report is about

This report presents the results of an impact assessment of a Horticulture Innovation Australia Limited (Hort Innovation) investment in *AV12007: Data collection to facilitate supply chain transparency.* The project was funded by Hort Innovation over the period September 2012 to August 2015.

Methodology

The investment was first analysed qualitatively within a logical framework that included activities and outputs, outcomes and impacts. Actual and/or potential impacts then were categorised into a triple bottom line framework. Principal impacts identified were then considered for valuation in monetary terms (quantitative assessment). Past and future cash flows were expressed in 2017/18 dollar terms and were discounted to the year 2018/19 using a discount rate of 5% to estimate the investment criteria and a 5% reinvestment rate to estimate the modified internal rate of return (MIRR).

Results/key findings

The investment in AV12007 has left participants in the avocado value chain better informed with weekly reporting of consumer price data and may potentially have delivered improved transparency and efficiency gains across the value chain.

Investment Criteria

Total funding from all sources for the project was $0.54 million (present value terms). All project funding was provided by Hort Innovation. The nature, scale and economic value of potential efficiency gains was unable to be quantified in this evaluation, mainly due to lack of evidence regarding how this data was utilised. As none of the impacts/potential impacts identified were valued in monetary terms, the full set of investment criteria were not estimated or reported as part of this impact assessment.

Conclusions

Project AV12007 project was successful in that the project objectives were achieved. Real time consumer price data was collated and communicated to members of the avocado industry and may have improved the transparency and efficiency of the avocado value chain.

Keywords

Impact assessment, cost-benefit analysis, AV12007, avocado, retail prices, retail, data collection, supply chain transparency, price surveys.

Introduction

All research and development (R&D) and marketing levy investments undertaken by Horticulture Innovation Australia Limited (Hort Innovation) are guided and aligned to specific investment outcomes, defined through a Strategic Investment Plan (SIP). The SIP guides investment of the levy to achieve each industry's vision. The current industry SIPs apply for the financial years 2016/17 – 2020/21.

In accordance with the Organisational Evaluation Framework, Hort innovation has the obligation to evaluate the performance of its investment undertaken on behalf of industry.

This impact assessment program addresses this requirement through conducting a series of industry-specific ex-post independent impact assessments of the apple & pear (AP), avocado (AV), mushroom (MU) and table grape (TG) RD&E investment funds.

Twenty-seven RD&E investments (projects) were selected through a stratified, random sampling process. The industry samples were as follows:

- Nine AP projects were chosen worth $15.46 million (nominal Hort Innovation investment) from an overall population of 19 projects worth an estimated $33.31 million,
- Seven AV projects worth $1.91 million (nominal Hort Innovation investment) from an overall population of 27 projects worth approximately $9.97 million,
- Five MU projects worth $1.75 million (nominal Hort Innovation investment) from a total population of 20 projects worth $7.94 million, and
- Six TG projects worth $2.84 million (nominal Hort Innovation investment) from an overall population of 11 projects worth $5.0 million.

The project population for each industry included projects where a final deliverable had been submitted in the five-year period from 1 July 2013 to 30 June 2018.

The projects for each industry sample were chosen such that the investments represented (1) at least 10% of the total Hort Innovation RD&E investment expenditure for each industry, and (2) the SIP outcomes (proportionally) for each industry.

Project *AV12007: Data collection to facilitate supply chain transparency* was randomly selected as one of the 22 unique MT18009 investments and was analysed in this report.

General Method

The impact assessment follows general evaluation guidelines that are now well entrenched within the Australian primary industry research sector including Research and Development Corporations, Cooperative Research Centres, State Departments of Agriculture, and some universities. The approach includes both qualitative and quantitative descriptions that are in accord with the impact assessment guidelines of the CRRDC (CRRDC, 2018).

The evaluation process involved identifying and briefly describing project objectives, activities and outputs, outcomes, and impacts. The principal economic, environmental and social impacts were then summarised in a triple bottom line framework.

Some, but not all, of the impacts identified were then valued in monetary terms. Where impact valuation was exercised, the impact assessment uses cost-benefit analysis as its principal tool. The decision not to value certain impacts was due either to a shortage of necessary evidence/data, a high degree of uncertainty surrounding the potential impact, or the likely low relative significance of the impact compared to those that were valued. The impacts valued are therefore deemed to represent the principal benefits delivered by the project. However, as not all impacts were valued, the investment criteria reported for individual investments potentially represent an underestimate of the performance of that investment.

Background & Rationale

Avocado Industry

The Australian avocado industry is one of Australia's 'growth' horticultural industries as illustrated in Table 1 below.

Table 1: Avocado Industry Performance 2014-2018

Year ended June	Production (tonnes)	Gross Value of Production (m$)	Farmgate value (m$)	Export value (m$)
2014	48,715	313	297	5.6
2015	57,595	356	331	6.4
2016	66,716	438	412	9.2
2017	65,992	398	374	12.5
2018	77,032	557	543	11.6
Average	63,210	412	391	9.1

Source: Facts at a Glance for the Australian avocado industry-2017/18 (Avocados Australia, 2018).

While avocados are grown in all Australian States and the Northern Territory, production is dominated by Queensland followed by Western Australia; together these two states produced 87% of avocados in 2017/18. Due to the broad range of climatic conditions and locations where avocados are grown, they are produced nearly all year round. Two varieties of avocados dominate the industry: Hass (78%) and Shepard (19%) (Avocados Australia, 2018).

Australian consumption of avocados has increased in line with the production increase. Based on new plantings, production of Australian avocados is expected to increase significantly in the next few years. Avocado exports are minimal at 2.3% of production in 2017/18, but growth in exports is expected in the future if the third desired outcome in the industry's Strategic Investment Plan (SIP) is achieved (10% of production exported - see below).

The marketing and research and development activities of the avocado industry are guided by the industry's SIP. The activities are funded by levies payable on avocados produced in Australia; the marketing and R&D levy funds are managed by Hort Innovation.

The previous avocado Industry Strategic Plan expired in 2015 and placed emphasis on development of the domestic market, increased production for year round supply, and the maintenance of demand and price via marketing programs and supply of consistent quality avocados.

The current SIP has been driven by levy payers and addresses the Australian avocado industry's needs from 2017 to 2021. Strategies and priorities in the Plan have been driven by a set of four desired outcomes (Avocados Australia, 2017).

1. By 2021, increase domestic demand for Australian avocados has increased by at least 20%.
2. By 2021, over 90 per cent of avocados received by consumers will meet or exceed their expectations of quality.
3. By 2021, over 10 per cent of production will be exported to markets where customers have a willingness and capacity to pay a premium for Australian avocados.
4. By 2021, productivity (marketable yield per hectare) has improved by 15 per cent on average, without increased production costs per kilogram.

Rationale

AV12007, the Data collection to facilitate supply chain transparency project, was consistent with the objectives of the Avocado Strategic Investment Plan 2017-2021 (Avocados Australia, 2017). The project is aligned with the following stated Outcome in the Plan: 'By 2021, domestic demand for Australian avocados has increased by at least 20%'. In particular, AV12007 aligns with the Strategy: 'Modern production and market information collection, analysis and sharing across the value chain'.

Prior to this project being funded, growers did not have access to timely consumer price data. The provision of timely consumer price data back through the supply chain was expected to enable industry (growers, packers, wholesales, others) to manage volumes throughout the season in response to price fluctuations.

AV12007 was a continuation of research completed in a previous project AV07023 *Avocado Retail Price Surveys;* this earlier project enabled the provision of weekly price monitoring across all major markets. AV12007 also builds upon project AV09001 *National Avocado Quality and Information System* that developed an avocado industry crop forecasting system (Infocado) and a tree planting and production information system (OrchardInfo). The work conducted within project AV09001 is continuing through projects including AV15004 (*Avocado data management and quality innovation extension program*) and AV16006 (*Avocado industry and market data capture and analysis*). These two follow-on projects have ensured the Infocado and Orchardinfo systems are maintained, and other relevant local data analysis and reporting to industry occurs.

To further strengthen information available along the supply chain a three year data collection and analysis project was funded to gather data regarding the price consumers pay for avocados; this was to complement the already existing datasets and communicate the information to improve the transparency of operations along the avocado supply chain.

Project Details

Summary

Project Code: AV12007
Title: *Data collection to facilitate supply chain transparency*
Research Organisation: Avocados Australia Limited
Principal Investigator: John Tyas
Period of Funding: September 2012 to August 2015

Objectives

The objectives of this project were to:

1. provide members of the avocado industry with retail price information which in combination with volume data compiled through Infocado will enable industry to make informed business decisions, and
2. improve understanding by industry of the relationship, if any, between retail prices and throughput, to assist in future modelling and economic forecasting.

Logical Framework

Table 2 provides a description of AV12007 in a logical framework.

Table 2: Logical Framework for Project AV12007

Activities and Outputs	• Retail price data were collected over a three-year period using a hand-held device and an application was created in November 2012 for use on an iPhone by MyWorkspace in collaboration with Avocados Australia. In addition to price data, the following retail information was also captured: number of in store displays, pack type, average fruit weights and country of origin. • Raw data in easily accessible electronic form for economic analysis were collated, analysed, reported and communicated. • A desktop study conducted over an 8 week period during August-September 2015 was completed to establish any variation between the retail pricing data collated by Avocados Australia Limited, and the data reported on-line. Based on these findings, recommendations to improve the efficiency of future weekly data collection activities were developed. • Retail prices for avocados were collated from outlets in four capital cities: Brisbane,

	Sydney, Melbourne and Perth. • Weekly reporting of retail prices was carried out via - the Avocados Australia website, - Talking Avocados magazine, - Weekly Infocado Reports, and - relevant supply chain stakeholder meetings. • The following recommendations were made in the AV12007 Final Report: - Retail price data collection should continue to assist in providing supply chain transparency. - A new, low-cost retail price monitoring methodology using on-line retail price data was recommended for development and adoption. - If continuing to provide retail price information on a regular basis, industry efforts should be made to encapsulate wholesale price data for greater supply chain transparency. - Economic analysis should be conducted on the relationship, if any, between supply forecasts and wholesale and retail price trends. • A 257-page Final Report for project AV12007 was produced.
Outcomes	• Avocado industry supply chain participants accessed the new national avocado retail price information on a weekly basis, potentially to inform business decisions. This may have enabled supply chains to operate more efficiently and provided opportunities to maximise returns and better meet consumer needs and expectations. As a result of monitoring weekly retail prices across all major markets, indicative prevailing retail prices and trends were able to be determined. This allowed suppliers to easily identify any market supply issues. • Improved understanding by industry of the relationship, if any, between retail prices and throughput to assist in future modelling and economic forecasting. • Members of the avocado industry downloaded the data published within this project. Members potentially made informed business decisions as a result of timely retail price information and volume data, however no evidence exists to support this (John Tyas, pers. comm., 2019). • Avocados Australia Limited implemented all the following recommendations made in the AV12007 Final Report (John Tyas, pers. comm., 2019). - Economic analysis was completed to determine the nature of any relationship between supply forecasts and wholesale and retail price trends. No relationship was able to be identified due to the influence of other variables such as weather (e.g. in cooler months there is lower demand for avocado). Further work showed stage of ripeness (e.g. hard green fruit, ripe fruit) potentially disrupted a meaningful relationship as stage of ripeness is currently not determined in the volume data (Adam Briggs, pers. comm., 2019). - Data are low-cost to collect and are still collected by Avocados Australia Limited although the benefit of reporting this data remains unknown. Some participants along the supply chain have stated the data are useful, others state it is not useful. The information is frequently downloaded from the website (John Tyas, pers. comm., 2019).
Impacts	• Potential contribution to improved efficiency of supply chain operations as a result of identification of market over- or under- supply issues. Difficulties are associated with the quantification of efficiency benefits flowing on from this research as it is unclear who is utilising the data and to identify the decisions it enhances (John Tyas, pers. comm., 2019). • Increased capacity in retail price data collection and analytics.

Project Investment

Nominal Investment

Table 3 shows the annual investment (cash and in-kind) in project AV12007 by Hort Innovation. There were no 'other' investors in this project.

Table 3: Annual Investment in the Project AV12007 (nominal $)

Year ended 30 June	Hort Innovation ($)	Other ($)	Total ($)
2013	96,703	0	96,703
2014	116,043	0	116,043
2015	96,703	0	96,703
2016	39,789	0	39,789
Totals	349,239	0	349,239

Program Management Costs

For the Hort Innovation investment the cost of managing the Hort Innovation funding was added to the Hort Innovation contribution for the project via a management cost multiplier (1.162). This multiplier was estimated based on the share of 'payments to suppliers and employees' in total Hort Innovation expenditure (3-year average) reported in the Hort Innovation's Statement of Cash Flows (Hort Innovation Annual Report, various years). This multiplier was then applied to the nominal investment by Hort Innovation shown in Table 3.

Real Investment and Extension Costs

For the purposes of the investment analysis, investment costs of all parties were expressed in 2017/18 dollar terms using the Gross Domestic Product deflator index. There were no additional costs associated with project extension. Results were communicated to growers and others as part of the project.

Impacts

Table 4 provides a summary of the principal types of impacts delivered by the project. Impacts have been categorised into economic, environmental and social impacts.

Table 4: Triple Bottom Line Categories of Principal Impacts from Project AV12007

Economic	• Potential contribution to improved efficiency of supply chain operations as a result of identification of market over- or under- supply issues. Difficulties are associated with the quantification of efficiency benefits flowing on from this research as it is unclear who is utilising the data and the specific decisions it enhances (John Tyas, pers. comm., 2019).
Environmental	• Nil.
Social	• Increased capacity in retail price data collection and analytics.

Public versus Private Impacts

Predominantly private impacts were identified in this evaluation. Private benefits may potentially be realised by avocado growers, packers, wholesalers, and others in the avocado supply chain operating more efficiently and responsively to retail price changes. As a result of increased capacity in retail price data collection and analytics, private benefits to the avocado industry potentially may be realised.

Distribution of Private Impacts

Any positive impacts on the avocado industry from investment in this project are likely shared along the supply chain among growers, packers, wholesalers, retailers and consumers.

Impacts on Other Australian Industries

Impacts on industries other than the avocado industry are not anticipated from the AV12007 investment.

Impacts Overseas

No significant overseas impacts of AV12007 were identified.

Match with National Priorities

The Australian Government's Science and Research Priorities and Rural RD&E priorities are reproduced in Table 5. The project findings and related impacts will contribute to Rural RD&E priority 4 and to Science and Research Priority 1.

Table 5: Australian Government Research Priorities

Australian Government	
Rural RD&E Priorities (est. 2015)	**Science and Research Priorities (est. 2015)**
1. Advanced technology 2. Biosecurity 3. Soil, water and managing natural resources 4. Adoption of R&D	1. Food 2. Soil and Water 3. Transport 4. Cybersecurity 5. Energy and Resources 6. Manufacturing 7. Environmental Change 8. Health

Sources: (DAWR, 2015) and (OCS, 2015)

Alignment with the Avocado Strategic Investment Plan 2017-2021

The strategic outcomes and strategies of the avocado industry are outlined the Avocado Strategic Investment Plan 2017-2021[1] (Hort Innovation, 2017). Project AV12007 addressed Outcome 1 (Strategy 1.3).

Valuation of Impacts

Impacts Valued

This investment in AV12007 did not produce any readily identifiable or quantifiable impacts, so no quantitative evaluation processes were applied.

Impacts Not Valued

This project potentially contributed to improved efficiency of supply chain operations as a result of identification of market over- or under- supply issues. However, significant difficulties are associated with the quantification of efficiency benefits flowing on from this research as it is unclear who utilised the data and how it could have been used to enhance decision making (John Tyas, pers. comm., 2019).

The potential economic impact identified in Table 4 of efficiency gains along the supply chain was not valued as impacts were hard to identify and value due to lack of evidence/data, difficulty in quantifying the causal relationship and pathway between AV12007 and the impact.

The social impact identified but not valued was increased capacity in data collation and analysis due to difficulty in identifying the impact pathway between increased capacity and future potential impact.

[1] For further information, see: https://www.horticulture.com.au/hort-innovation/funding-consultation-and-investing/investment-documents/strategic-investment-plans/

Results

All past costs were discounted to 2018/19 using a discount rate of 5%. No impacts were valued; thus, the investment criteria reporting was limited to the Present Value of Investment Costs (PVC). To ensure consistency with other Hort Innovation project analyses and reporting, the PVC was reported for the length of the project investment period plus 30 years from the last year of investment (2015/16) as per the CRRDC Impact Assessment Guidelines (CRRDC, 2018).

Investment Criteria

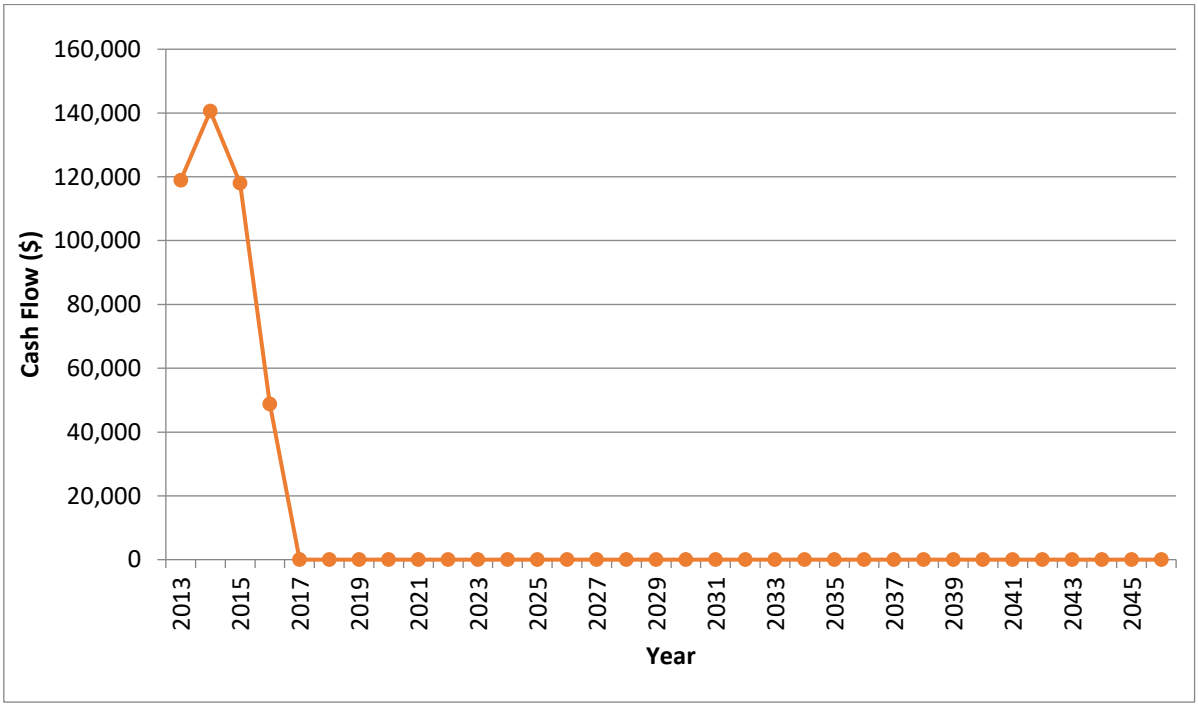
Table 6 shows the investment criteria estimated for different periods of benefit for the total investment. Hort Innovation was the only funding contributor to this project, so there is no second set of analyses showing results for Hort Innovation.

Table 6: Investment Criteria for Total Investment in Project AV12007

Investment Criteria	Years after Last Year of Investment						
	0	5	10	15	20	25	30
Present Value of Costs ($m)	0.54	0.54	0.54	0.54	0.54	0.54	0.54

The annual undiscounted benefit and cost cash flows for the total investment for the duration of AV12007 investment plus 30 years from the last year of investment are shown in Figure 1.

Figure 1: Annual Undiscounted Investment Costs for Project AV12007



Conclusion

The investment in AV12007 has left participants in the avocado value chain better informed with weekly reporting of consumer price data. This output may potentially have delivered improved transparency and efficiency gains across the value chain. The nature, scale and economic value of potential efficiency gains was unable to be quantified in this evaluation, mainly due to lack of evidence regarding how and by whom the weekly consumer price data were utilised.

Glossary of Economic Terms

Cost-benefit analysis:	A conceptual framework for the economic evaluation of projects and programs in the public sector. It differs from a financial appraisal or evaluation in that it considers all gains (benefits) and losses (costs), regardless of to whom they accrue.
Benefit-cost ratio:	The ratio of the present value of investment benefits to the present value of investment costs.
Discounting:	The process of relating the costs and benefits of an investment to a base year using a stated discount rate.
Internal rate of return:	The discount rate at which an investment has a net present value of zero, i.e. where present value of benefits = present value of costs.
Investment criteria:	Measures of the economic worth of an investment such as Net Present Value, Benefit-Cost Ratio, and Internal Rate of Return.
Modified internal rate of return:	The internal rate of return of an investment that is modified so that the cash inflows from an investment are re-invested at the rate of the cost of capital (the re-investment rate).
Net present value:	The discounted value of the benefits of an investment less the discounted value of the costs, i.e. present value of benefits - present value of costs.
Present value of benefits:	The discounted value of benefits.
Present value of costs:	The discounted value of investment costs.

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Abbreviations

AP	Apple and Pear
AV	Avocado
CRRDC	Council of Research and Development Corporations
DAWR	Department of Agriculture and Water Resources (Australian Government)
MIRR	Modified Internal Rate of Return
MU	Mushroom
OCS	Office of Chief Scientist Queensland
PVC	Present Value of Costs
R&D	Research and Development
RD&E	Research, Development and Extension
SIP	Strategic Investment Plan
TG	Table Grape